I Claim

1. An apparatus for identifying an unknown DNA sample, said apparatus comprising:

a plurality of detection nodes, each of said detection nodes operable for allowing an interaction between a known DNA sample and an unknown DNA sample, and for generating an output signal if hybridization occurs between said known DNA sample and said unknown DNA sample; and

a decoder operative for receiving an input signal indicative of which of said plurality of detection nodes should be selected for processing, and for outputting control signals which operate to activate said selected detection node;

wherein each of said detection nodes includes a first floating gate transistor comprising a floating gate terminal having said known DNA sample and said unknown DNA sample disposed thereon, said first floating gate transistor having a conductance value which varies if hybridization occurs between said known DNA sample and said unknown DNA sample contained in said detection node, said change in said conductance value is operative for generating said output signal.

2. The apparatus of claim 1, wherein said output signal has an amplitude which varies in accordance with variations of said conductance value of said first floating gate transistor.

3. The apparatus of claim 1, wherein each detection node further comprises:

a first voltage divider circuit capable of generating a first reference voltage signal;

a second voltage divider circuit capable of generating a second reference voltage signal; and

a differential amplifier for receiving said first reference voltage signal and said second reference voltage signal as input signals, and for generating said output signal, said output signal representing a difference between said first reference voltage signal and said second reference voltage signal;

wherein said second voltage divider circuit includes said first floating gate transistor, and a variation in said conductance value of said first floating gate transistor causes a corresponding variation in said second reference voltage signal.

4. The apparatus of claim 3, wherein said detection node further comprises:

a first pass transistor operative for coupling a voltage supply to said first voltage divider and said second voltage divider; and

a second pass transistor operative for coupling an output of said differential amplifier to an output port of said detection node;

said first pass transistor and said second pass transistor being activated by said control signals output by said decoder.

5. The apparatus of claim 1, wherein hybridization of said known DNA sample and said unknown DNA sample causes an increase in a charge on said floating gate terminal of said first floating gate transistor, said increase in said charge on said floating gate terminal generating an increase in said conductance value of said first floating gate transistor.

6. The apparatus of claim 5, wherein in said known DNA sample has a highly negative charged molecule attached thereto.

7. The apparatus of claim 3, wherein said first voltage divider circuit includes a second floating gate transistor having said known DNA sample disposed on a floating gate terminal of said second floating gate transistor, said second floating gate transistor comprising the same amount of the known DNA sample as said first floating gate transistor such that said first reference voltage signal and said second reference voltage signal are equal if said known DNA sample and said unknown DNA sample do not hybridize in said first floating gate transistor.

8. A biosensor cell for identifying an unknown DNA sample, said cell comprising:

a first voltage divider circuit capable of generating a first reference voltage signal;

a second voltage divider circuit capable of generating a second reference voltage signal; and

a differential amplifier receiving said first reference voltage signal and said second reference voltage signal as input signals, and for generating an output signal, said output signal representing a difference between said first reference voltage signal and said second reference voltage signal;

wherein said second voltage divider circuit includes a first floating gate transistor comprising a floating gate terminal having a known DNA sample disposed thereon and capable of receiving said unknown DNA sample, said first floating gate transistor having a

conductance value which varies if hybridization occurs between said known DNA sample and said unknown DNA sample when said unknown DNA sample is delivered to said floating gate terminal of said first floating gate transistor.

9. The biosensor cell of claim 8, wherein a variation in said conductance value of said first floating gate transistor causes an increase in the amount of current flowing through said first floating gate transistor, which causes a corresponding variation in said second reference voltage signal.

10. The biosensor cell of claim 8, wherein said output signal has an amplitude which varies in accordance with variations of said conductance value of said first floating gate transistor.

11. The biosensor cell of claim 8, further comprising:

a first pass transistor operative for coupling a voltage supply to said first voltage divider and said second voltage divider; and

a second pass transistor operative for coupling an output of said differential amplifier to an output port of said biosensor cell;

said first pass transistor and said second pass transistor being activated by external control signals.

12. The biosensor cell of claim 8, wherein hybridization of said known DNA sample and said unknown DNA sample causes an increase in a charge on said floating gate

terminal of said first floating gate transistor, said increase in said charge on said floating gate terminal generating an increase in said conductance value of said first floating gate transistor.

13. The biosensor cell of claim 8, wherein in said known DNA sample has a highly negative charged molecule attached thereto.

14. The biosensor cell of claim 8, wherein said first voltage divider circuit includes a second floating gate transistor having said known DNA sample disposed on a floating gate terminal of said second floating gate transistor, said second floating gate transistor comprising the same amount of the known DNA sample as said first floating gate transistor such that said first reference voltage signal and said second reference voltage signal are equal if said known DNA sample and said unknown DNA sample do not hybridize in said first floating gate transistor.

15. A biosensor cell for identifying an unknown DNA sample, said cell comprising:

means for generating a first reference voltage signal;

means for generating a second reference voltage signal; and

means for receiving said first reference voltage signal and said second reference voltage signal as input signals, and for generating an output signal, said output signal representing a difference between said first reference voltage signal and said second reference voltage signal;

wherein said means for generating said first reference voltage includes a first floating gate transistor comprising a floating gate terminal having a known DNA sample disposed thereon and capable of receiving said unknown DNA sample, said first floating gate transistor having a conductance value which varies if hybridization occurs between said known DNA sample and said unknown DNA sample when said unknown DNA sample is delivered to said first floating gate terminal of said first floating gate transistor.

16. The biosensor cell of claim 15, wherein a variation in said conductance value of said first floating gate transistor causes a corresponding variation in said second reference voltage signal.

17. The biosensor cell of claim 15, wherein hybridization of said known DNA sample and said unknown DNA sample causes an increase in a charge on said floating gate terminal of said first floating gate transistor, said increase in said charge on said floating gate terminal generating an increase in said conductance value of said first floating gate transistor.

18. The biosensor cell of claim 15, wherein in said known DNA sample has a highly negative charged molecule attached thereto.

19. The biosensor cell of claim 15, wherein said means for generating a first reference signal includes a second floating gate transistor having said known DNA sample disposed on a floating gate terminal of said second floating gate transistor, said second

floating gate transistor comprising the same amount of the known DNA sample as said first floating gate transistor such that said first reference voltage signal and said second reference voltage signal are equal if said known DNA sample and said unknown DNA sample do not hybridize in said first floating gate transistor.

20. A method of identifying an unknown DNA sample, said method comprising the steps of:

generating a first reference voltage signal;

generating a second reference voltage signal utilizing a first floating gate transistor having a floating gate terminal, said floating gate terminal having a known DNA sample disposed thereon and capable of receiving said unknown DNA sample, said first floating gate transistor having a conductance value which varies if hybridization occurs between said known DNA sample and said unknown DNA sample when said unknown DNA sample is delivered to said floating gate terminal; and

generating an output signal representing a difference between said first reference voltage signal and said second reference voltage signal.

21. The method of claim 20, wherein a variation in said conductance value of said first floating gate transistor causes a corresponding variation in said second reference voltage signal.

22. The method of claim 20, wherein hybridization of said known DNA sample and said unknown DNA sample causes an increase in a charge on said floating gate

terminal of said first floating gate transistor, said increase in said charge on said floating gate terminal generating an increase in said conductance value of said first floating gate transistor.

23. The method of claim 20, wherein in said known DNA sample has a highly negative charged molecule attached thereto.

24. The method of claim 20, wherein said method of generating a first reference signal includes a second floating gate transistor having said known DNA sample disposed on a floating gate terminal of said second floating gate transistor, said second floating gate transistor comprising the same amount of the known DNA sample as said first floating gate transistor such that said first reference voltage signal and said second reference voltage signal are equal if said known DNA sample and said unknown DNA sample do not hybridize in said first floating gate transistor.